CYSF LOGBOOK

**December 16, 2024:**

I submitted my project proposal. My project was an innovation project called Using Biomimicry To Help Improve Structural Stability. I need to confirm if all parts of my project are good to go with my science teacher Mr. Degelder. By the end of today, I should know if my proposal is approved or if I need to add anything else.

Topic planning- I had many topics that I wanted to do for the school science fair but out of the 8 different projects I had in mind, I singled it out to 2 different projects. These projects were Using Biomimicry to Help Improve Structural Stability and Creating the Car Crash Protection System, both innovation projects. The reason I wanted to do the car-crash protection system was because right now in the winter, many crashes are taking place due to the icy roads. My plan was to develop a new protection system and an inflatable airbag would be deployed when the car was about to have an impact. By doing this, the car itself and the object it had a collision with won’t get damaged in any way. The second project, Using Biomimicry to Help Improve Structural Stability was inspired by a landslide that took place in Wayanad, Kerala, India last summer. I thought that maybe I could create a way to prevent all the destruction that took place during the landslide using scientific methods. The reason why I picked the second project is because it seemed a lot more easier as it would be easier to build and test when compared to the first project. After discussing this with my parents and my science teacher, I finalized my decision to the project, Using Biomimicry to Help Improve Structural Stability.

**December 20, 2024:**

My proposal for science fair was approved and I just created my google slides presentation. I began a bit of research on biomimicry. Winter break starts tomorrow so I’m planning to do more work during the break.

**December 23, 2024:**

I further researched biomimicry through a website from the biomimicry institute. I watched the video that was on the website and wrote on my slides the basic requirement to achieve biomimicry. This included emulation, ethical framework and (re)connection.

**December 24, 2024:**

I had only written the slide for “What is Biomimcry?”. So today I also added a table of contents that said what I thought might be included in my presentation and I started the introduction. Originally I was writing an abstract but when I looked up the criteria for an abstract, I realized I didn’t have enough information to write a complete abstract so I titled my starting paragraph as an introduction instead.

**December 27, 2024:**

As I was busy over the last 3 days, I was not able to get much work done due to Christmas. Today I finished my introduction and I also added a slide called basic project information where I stated my problem, hypothesis, and my objective for the project. I added the 2 links I used to my bibliography as well.

**December 28, 2024:**

I started my “Project and Solution” slide and began researching about the Wayand landslide. I’m having some trouble finding information about structural failures during the Wayand flood as well as how much magnitude of force that landslide was.

**December 30, 2024:**

I finished my problem and solution slide. I wasn’t able to find how much force the landslide had but I was able to find why the landslide was caused. Apparently, the landslide was caused when rainfall created a large amount of mud and began eroding a mountain side. As the mud began slipping down, it eventually began collecting rocks and trees and water and turned into a large landslide. The landslide triggered multiple other landslides that all headed to a town in Wayanad that was near the base of the mountains, destroying almost the entire town. In addition to this, Wayand is in a pretty remote place, which makes it very difficult to get help.

**January 5, 2025:**

School is going to start tomorrow so I’m not going to get as much time to do my project. I added all my current sources to the bibliography and started my slide for the design idea. I also looked at free websites or platforms I could use for designing and testing.

**January 8, 2025:**

I wasn’t able to find any platforms for designing but I did find some information about the basic types of structures. The structures are shell structures, solid structures and frame structures.

Solid structures- Are structure made up of materials that are strong and sturdy like concrete

Frame Structures- Structures that use multiple connecting pieces to ensure stability

Shell Structures- Structures that are made using a thin curved material but are strong and rigid like eggshells.-I think this may be the type of structure that I’m least likely to use for my design just because of how a shell structure can break if a great amount of force is applied at a single point.

I'm going to have to see when I’m going to work on the rest of my project because this week and next week are going to be busy and plus tomorrow’s my birthday so I’m not sure how much work I’m going to get done.

**January 12, 2025:**

Today we had a science fair meeting at school today during lunch. We just covered effective presentation techniques and information about science fair. Today I finished my slide for shell, solid, and frame structures and just made sure that my presentation so far covered the guidelines. Today I just checked out what forces could be applied onto a structure.

**January 15, 2025:**

Today I made a design and planning slide and am almost done with the slide. I watched a youtube video(<https://www.youtube.com/watch?v=2e_7Pn_xKZo>) about forces that are applied onto structures. I found this video very helpful as I wrote my structure design, materials, forces and extra factors onto my design and planning slide.

**January 19, 2025:**

Since I had a lot of free time this week, I was able to finish a lot. I finished the design and planning as I finished the rules for structures, slide as well as created and finished the forces, structure design, incorporating biomimicry into my design, natural structures, and structural shapes slides. For biomimicry, I decided on 3 natural aspects. This included the beehive where I took its hexagonal pattern into my design, the spider web where I decided to base my second design on the spiral orb web, and the cell wall where I made my third design be based on the interlocking cellulose found in the cell wall. I also asked some of my friends in highschool about any design platforms they were familiar with. I originally started with SKYCIV, a design and engineering platform. Though I quickly stopped using it as I was very unfamiliar with the tools and wasn’t very sure on how to build my designs and test them online. Eventually I found a website called SMARTDRAW that allowed me to create housing or infrastructure blueprints. The downside to this was that it wasn’t in 3D and did not consist of an online simulator that tested my designs against external factors. Yet I still made all my designs on SMARTDRAW and began making a procedure and materials slide.

**January 21, 2025:**

By this time I had already built my structural designs which I had to change multiple times because of its weight, toothpicks breaking, cutting the toothpick too small, having overlapping pieces, and having to change the material for the inner frame. I began to work on my analysis. I had finished the materials and procedure slide and already had the linear actuator switch ready to go.

I hit a huge roadblock over the last 2 weeks, I wasn’t able to get the linear motion track, plywood and vibration motor. Without plywood I wasn’t able to do the stress test and earthquake test. During the load test, all the structures were able to hold weights of 1 kg but because I didn’t have enough loads of some weight, I couldn’t properly add a controlled increase which makes the experiment invaluable. I need to ask the teacher tomorrow about what I can do as I am not able to do any of the tests. Though I am almost done with my project I only have six days left as the project is due on the 27th.

**January 22, 2025:**

I talked to my science teacher and received feedback on how I should proceed with my project. I decided to put all of the setbacks with my experiment in my sources of error so that the experiments can be done if I can get into CYSF. The teacher also said submissions were only due on January 31, which gave me about 4 extra days.

**January 24, 2025:**

Today I received an email on D2L about the ethics and due care form having to be completed. Since you aren’t able to attend the science fair unless this form gets approved, I diverted my attention to the forms and began filling them out.

**January 25, 2025:**

I filled out my basic project information today on the CYSF platform and submitted it. I also finished my Ethics and Due Care form 2A today but I have not submitted it because I still want my parents to review it and make sure I am not missing any information. I did not fill out the Significant Risk form 2B because I didn’t think that my project had any significant risk. I also started my real world applications slide.

**January 27, 2025:**

I sent my ethics form yesterday and it got approved today. I just finished my real world applications and have started my conclusion slide as well as citing my sources in APA format. Currently I am reviewing my presentation and making sure I have covered all the criteria.

**January 31, 2025:**

I finished my conclusion and citations and have also added a slide for progression of the project. I am going to do one final review of my project before recording and submitting it.

**February 18, 2025:**

I have now been selected for CYSF. Today I continued to add by information to the method section on the CYSF platform

**February 20, 2025:**

Today I began to get the rest of my supplies. For the vibration monitor, I was not able to find anything small enough that could detect vibrations. But after watching a video by DFRobot, I decided to program a micro bit that would measure vibrations and acceleration.

**Feb 22, 2025:**

I had bought my microbit and began looking at how to program it today. I made all the main frames for my structures. I also changed my design from using toothpicks and making a smaller scale model, I used barbecue sticks instead to make a larger more stable model.

**Feb 23, 2025:**

I decided to redesign some of my designs as I need to make sure that each design used the same number of barbecue sticks and had the same weight.

**Feb 27:**

I finished half of my first structure, the spider web structure. I still have to finish the arches but I am having the trouble of bending the barbecue sticks without breaking them. My dad also helped me program my microbit today. Using the Microsoft MakeCode website, we programmed the microbit so that it measured and graphed the strength of vibration from the x and y axis. As my earthquake machine won’t move diagonally, we did not include the z axis but that can still be added if needed in the future.

**Feb 28, 2025:**

Instead of using a linear motion track, I decided to make my earthquake simulator based on the one used in this video:<https://www.youtube.com/watch?v=EWlnYXfWSH>. I felt this design for the simulator was a lot easier as it could be built relatively easily and would not cost as much as a linear motion track. In addition to this, it would replicate an earthquake a lot better.

**March 2, 2025**

Today I received the motor required for my earthquake simulator. It is fairly large so I need to see if it will work with the platform on the simulator without breaking it. I also filled up most of the content on the platform. I still have to finish my analysis, method, and take my video. I also need to finish my participant requirements to be registered.

**March 7, 2025**

Today I added all my participant requirements to the platform. I am still waiting for it to be approved. Today I finished the beehive structure and am almost done with the cell wall structure. I am still trying to figure out how to add the arches on the spider web structure.

**March 10, 2025**

I finished mostly everything on the platform except for the analysis and my video. My project has also been registered for CYSF now. In addition, my cell wall structure is also now complete and I am about a third done with the basic structure design. I began building my simulator where I used lego wheels to move the platform further.

**March 14, 2025:**

Today I finished the earthquake simulator and setting up the motor. But the motor turned out to be too powerful for the earthquake simulator so I now need to use a smaller circular motor. The Linear actuator is also ready to go now so I can do the force test. I still need to get my loads for the load test.

**March 16, 2025:**

I received the new motor today but am still in the process of building it. I also finished building all my structures. I made the arches for the spider web design by soaking the barbecue sticks in water. If you left it in there for a while, the sticks became soft, making it easier to bend and mold them.

**March 18, 2025:**

I finished setting up the motor but it does not have a variable resistor, meaning I currently can not change the speed of the motor. I watched a video online and used a Ur sensor/potentiometer to try and change the speed.

**March 20, 2025:**

I finished all my information on the platform and am taking my video today.

**March 21, 2025:**

Today I uploaded my video and logbook to the platform. I also did some editing.